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The Imperial Forestry Institute University of Oxford

TWENTY-SIXTH ANNUAL REPORT

1949-50

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UNIVERSITY OF OXFORD

TWENTY-SIXTH ANNUAL REPORT OF THE IMPERIAL FORESTRY INSTITUTE ACADEMIC YEAR, 1949-50

Students. The total number of students at the Institute during the year was 59, 39 being undergraduates. The record number of 30 took the Final Honour School, three obtaining First Class, seven Second Class, fourteen Third Class and four Fourth Class Honours, whilst two were over standing for Honours, but satisfied the Examiners. One of the two was already a member of the Colonial Forest Service and eight more of the 30 have since been appointed to that service. One of the successful candidates was a member of the Malayan subordinate Forest Service and will be the first Malayan to obtain a Forestry Degree and promotion to the higher service; another was an Indian and a third a native of Ceylon, these two hoping to get appointments in the Forest Services of their Dominions; three have obtained appointments in the Forestry Commission. Two of the four Colonial Forest Service scholars taking their second year's course decided not to sit for the degree examination.

The junior year numbered fourteen, and included two graduate Colonial Service Scholars who are now serving in Uganda and Gold Coast, and two students with scholarships from Ceylon. Several other students who were expected to be part of this group, decided to read subjects other than forestry.

The Colonial Forest Officers' course was attended by eight officers, coming from the Gold Coast (2), Nigeria (2), Uganda (2), Nyasaland (1) and Trinidad (1). Three other Colonial Forest Officers were back at the University but were attending the 'Devonshire Course' organised for all branches of the Colonial Services, and accordingly did little forestry.

The new departure initiated last year of sending selected subordinate service officers from the Colonies for a special course, the satisfactory completion of which may lead to promotion, was continued, two Nigerian Forest Assistants and one European Forester from Uganda being deputed. All three completed their courses very creditably.

One Indian Officer was deputed this year for the special course organised for Indian and Pakistan Forest Officers, no one was deputed from Pakistan but the existing arrangements are being maintained by both Governments.

Research students. There were two candidates for the Diploma in Forestry, one from China and Melbourne University studying the

mineral nutrient status of heathland communities, and a second, Mr. J. J. Gruenfeld, a forestry graduate of Colorada A. & M. College and a Fulbright Scholar, was working on an economic study.

Colonial Service Courses. The Professor gave the usual courses of lectures on Colonial Forestry to the Colonial Administrative Service Cadets at Oxford and Cambridge, and owing to a reorganisation under which a third group studied at London University only, he had also to give a course at Wye Agricultural College.

Student Tours. (1) An introductory tour in Britain for the students about to start their forestry course has been found to be very helpful. The programme is arranged to include examples of the major activities in representative forests and mills; thus natural and artificial regeneration in hardwoods and softwoods, big scale afforestation work including mechanised ploughing, a big nursery, a selected private estate, a sawmill, a turnery and silvicultural experimental work were all seen. This year the tour was made in Gloucestershire and South Wales, the Professor and Colonel Lloyd starting it off and Dr. Anderson conducting the latter part. The estate visited was Eastnor Castle, Ledbury.

(2) The junior class paid the usual visit to the forests of Normandy and the Landes conducted by Dr. Jones, the party numbering 24 with the inclusion of several senior students.

(3) The senior class made a tour in Belgium, forming a party of over 30, travelling in a bus from Oxford. Thanks to generous help from the Director General, M. Turner, and his staff, a most instructive series of visits was made in the Campine and the Ardennes, and various wood-using industries were also visited.

(4) The Colonial Forest Officers visited the Vosges and Jura forests in June/July, conducted by Colonel Lloyd and Dr. Anderson, finishing with a few days' stay in the adjoining parts of Switzerland.

(5) In April, Dr. Anderson took the same party on a short tour in the south of England to see representative forests and operations.

Working Plans. Most of the senior year completed their working plans in the New Forest, working from Northerwood House. Three Colonial Forestry Scholars who had done their Part I in High Meadow Woods, returned there for Part II. The junior year were not due under the revised timetable to do their Part I work until September, 1950.

Utilisation Course. The course for Senior Students at the Forest Products Research Laboratory was again arranged for the Christmas vacation. Special thanks are due to the Director and to Mr. C. W. Scott for the arrangements made and to those of the staff who gave demonstrations, etc.

Vacation Practical Work. It has now become the general rule for students to gain practical experience of forestry by working in the woods and mills during the vacations, especially the Long Vacation between taking Honour Moderations and starting on the forestry course. Students are encouraged to do this and every help is given to them in arranging it, as it ensures that they see forestry from the

workmen's point of view, and it makes the subsequent courses easier to grasp and more profitable. Such vacation work this year was done by four students in the New Forest, five in the N.W. Conservancy of the Forestry Commission, and three on private estates in Britain; seven students worked in the forests and sawmills of Norway and three others did practical work in Denmark.

Excursions. The following excursions were made with the senior and postgraduate students during the summer term: Woburn Abbey Estate, Alice Holt Woods and Research Station, Hunting Aero-Surveys Ltd., Elstree, Railway Workshops at Swindon, the Imperial Institute, Glikstens' Sawmills and Mallinson's Sawmills and Veneering Plant, London, and Furniture Industries and Composite Wood Factory at High Wycombe.

The junior year visited local woods mainly to study soils and silviculture with Dr. Jones and Dr. Anderson; Bagley Wood was most convenient for these purposes.

Thanks are tendered to all those who kindly gave facilities for these useful visits and to those who showed our parties over woods and works.

Discussions. The two now customary series of discussions for the Colonial officers and the senior year undergraduates were continued. There is naturally a good deal of variation in the standard attained but these discussions are believed to be well worth the time devoted to them.

Visiting Lecturers. As usual, a series of lectures was arranged, primarily for the postgraduate course, on subjects suggested by those attending the course, and dealing with fields not expressly covered by the staff of the Institute or with special aspects of forestry problems. Specialists in the selected subjects were invited to give a lecture and deal with questions arising from it. Among the subjects dealt with this year were genetics, virus disease, wild life conservation, forest ornithology, animal ecology, selective weed control and the use of artificial manures in forestry. The Institute is particularly indebted to these lecturers for giving up their time to come and give its students these most valuable and helpful talks.

Assistance from other Departments. The Department of Surveying and the Soil Science Laboratory have continued their special courses for forestry students, and the Institute is also much indebted to the Readers and their staff for help with the work of individual students. Dr. Russell's course on Tropical Soils was particularly appreciated as also was Mr. Masefield's on Tropical Agriculture.

Assistance given to other organisations. Dr. Anderson spent a week in the New Forest helping with a course on Forestry organised by the Forestry Commission for landowners and others. Dr. Chrystal has continued to visit the Foresters' Schools of the Forestry Commission to give short courses on Forest Entomology. He visited five schools in England, Scotland and Wales for this purpose during the year. The courses given by the Professor to Colonial Administrative

Service cadets and Agricultural probationers at Cambridge and London Universities on Colonial Forestry have already been mentioned.

Tuition. No significant changes were made in the arrangements for individual tuition. There was an exceptionally large number of senior class students (30) to deal with this year but this was compensated to some extent by the small number of the junior year (14).

Library, etc. Although the Library in the new building was completed some time before the end of the year, it was decided that the transfer should pend till the Long Vacation. The discovery that insufficient shelving had been provided to take all the periodicals as well as the books necessitated the belated adaptation of the proposed large reading room to accommodate the periodicals; this work was not completed till very shortly before the official opening. The urgently needed amendment of the classification system for forest literature which required international discussion and approval was again delayed. This has involved a good deal of extra work on the card indexes, but it now seems certain that the desired change will be made during next year, for the next volume of *Forestry Abstracts*. In the new building, the Commonwealth Forestry Bureau will be accommodated in the wing immediately adjoining the Library which should be convenient and time-saving for both parties, though the space which could be allotted to the Bureau is admittedly inadequate.

Wytham Woods. Work has continued according to the working plan drawn up by Dr. Anderson and approved by the University. The necessary steps are now being taken to dedicate the woods under the national scheme: it has already been unofficially ascertained that the working plan is acceptable to the authorities and practically the whole managed area will qualify for grants. The woods are being used to an increased extent for biological studies by several departments of the University.

Bagley Wood. Dr. Anderson has completed the detailed stock-mapping of the wood and is drafting a working plan. St. John's College has laid down its objects of management and decided to dedicate the whole wood with the exception of a strip along two road frontages; these will however be included in the plan as the only reason for their exclusion is to retain the right of control in case it might be needed at some future date.

Staff Tours. No long tours were made during the year. During the summer Mr. White was absent leading a scientific expedition to Lapland on which his own work was ecological. The Professor accompanied the postgraduate and senior classes during part of their tours in France and Belgium respectively. Mr. MacGregor attended an International Conference of Agricultural Economists at Stresa, Italy.

Research Field Station. The field station at Birch Hall on Allerston Forest in N.E. Yorkshire was maintained. The site has proved inconvenient and arrangements are being made to move to Wykeham Moor where the Forestry Commission Research Forester

has his quarters. Various members of the soil research team worked at the station from time to time. The help given there by Mr. Weatherell and his interest in the work were greatly appreciated.

Scientific Societies. The British Association meeting at Birmingham just after the end of the year was attended by the Professor, who is a member of the Council, and Mr. Day.

Members of the staff have been active on the Councils and Committees of numerous societies as in former years, particularly the forestry societies.

Government Committees. The Professor continues to serve on the Forestry Commission Research and Advisory Committee, and on the Committee for Colonial Agricultural, Animal Health and Forestry Research. Mr. N. V. Brasnett is on the Committee on Forestry of the Colonial Advisory Council of Agriculture, Animal Health and Forestry. Colonel A. H. Lloyd is on the Eastern Advisory Committee (Forestry Commission) and the Forest Products Research Board (Department of Scientific and Industrial Research). Mr. MacGregor has attended several meetings of the Forestry Study Group of the Imports Substitution Panel of the Cabinet Committee on Industrial Productivity.

Exhibitions. (1) *British Association.* Mr. Day put on an extensive exhibit at the meeting in Birmingham showing the relation of European Larch to its habitat with special reference to the phenomenon of die-back.

(2) *The Royal Agricultural Show, Oxford.* An exhibition was staged here by Mr. Day, with the collaboration of Mr. Dimbleby, to illustrate the effect of topographical formation in hill country in determining conditions for the growth of European larch through changes, according to position, in degree of exposure to wind, frost severity and soil water supply. The exhibition was based mainly on work carried out in Coed-y-Brenin by Mr. R. D. Pinchin, to whom acknowledgments are due, supplemented by air photographs arranged and demonstrated by Mr. Dimbleby. The scale model used to demonstrate topography and the photographs of plantation and vegetation types used in illustration of this were the work of Mr. D. K. Barrett.

(3) *Opening Exhibition.* Towards the end of the year a start was made on an exhibition, to be ready for the official opening of the new Institute, illustrating the scope of forestry and the work in progress.

Buildings, etc. The date for the formal opening of the new Institute building was fixed for October 19th, 1950, though much work remained to be done on the lower floors at the end of the year under report. The sections allocated to the top floor moved in during the Christmas Vacation and most of those on the first floor at the beginning of the Long Vacation. Even more than last year, Dr. Chalk and Dr. Handley have had to devote a great deal of time to the fitting and furnishing.

During the year the University promoted a decree implementing a decision of long standing to allocate some land round the building for experimental work. Originally, no difficulty had been expected

over the matter as the building itself would only occupy part of the site reserved for forestry. With the passage of time, it became necessary to provide a new building for the Department of Botany also, and this has taken up all the remaining land directly adjoining the forestry building. The best that could be done under the circumstances was to make available a small plot only 80 feet by 40 feet between two of the other science departments to take the necessary glasshouses and frames for which it will barely suffice, and a second plot about 76 feet by 56 feet for planting out small stock, etc.

Technical Assistants, etc. The senior assistants have continued to do excellent work both on the research work in progress in the several sections and, towards the end of the year, on the move to new quarters and the preparation of the exhibition for the opening. The junior members have now practically all completed their National Service and become sufficiently trained to be of real help in research work.

Secretarial Staff. There have been no significant changes in staff or organisation during the year. The large number of students and the move to the new building have entailed a lot of extra work which has been cheerfully shouldered and efficiently coped with. The internal telephone system provided in the new building should bring a valuable saving of work and time.

WYTHAM WOODS

The draft working plan prepared by Dr. Anderson was accepted by the University and formally introduced as from October 1st, 1949. Colonel Lloyd is in executive charge and has under him a resident forester, Mr. H. Probitts, who is again commended for a very good year's work, and four woodmen for whom suitable housing has been secured with much difficulty. Nearly all the completely treeless area has now been planted up, 19.6 acres having been so stocked during the year; intensive cultural work is now extending into the more or less wooded compartments.

Standing arrangements have been made for the drawing up of an annual plan of operations setting out all work that it is proposed to undertake. This will be issued to those concerned in biological research in the woods who will thus have an opportunity of drawing attention to any disturbance with their work so that this can be avoided by the woodland staff as far as possible. An annual check of operations carried out against operations prescribed is similarly provided for.

The Chalet has been used to a rather greater extent by some of the University departments. Twenty projects have been listed as in progress by a committee set up to advise on the arrangements, etc., for the 'biological reserves' excluded from normal forest management. The state of the roads continued to be the subject of complaints, but it cannot be accepted that their maintenance should all be charged against forestry.

BAGLEY WOOD

Owing to its easy accessibility, the variety of soil and vegetation types, and the existence of plantations made over the past 50 years, Bagley continues to be of greatest value for instructional purposes in conjunction with the regular courses and not a few special studies.

Dr. Anderson has completed the detailed stockmapping which will provide the basis for the working plan which he will draft when the owner, St. John's College, has decided on its policy with regard to dedication and formulated its objects of management.

Kennington Nursery. This is a research nursery run by the Forestry Commission on land adjoining Bagley Wood, rented by the Institute from St. John's College. The Head Forester in charge, Mr. W. G. Gray, has been continuously most helpful in demonstrating the work in progress and nursery techniques, as also in connection with various special studies by individual students.

SILVICULTURE

Dr. E. W. Jones conducted the normal lecture courses and field work in silviculture for all groups of students, including the silvicultural parts of working plans, day excursions and tours. He continued work on the field data collected by him in the rain forests of Nigeria in the previous year and undertook the revision of *Troup's Manual on Silvicultural Systems* which is now out of print.

Work by Mr. W. R. Day on the European larch, though primarily directed towards the factors determining the development of pathological conditions, as described below, involved the study of various silvicultural details for this species.

ECOLOGY

Mr. G. W. Dimbleby has been rounding off his intensive survey of the North-East Yorkshire Moors around Hackness and preparing the main results in a form suitable for publication. He has been able to demonstrate that the chief causes of difficulty in establishing and growing trees are attributable directly to the type of soil and its associated heath vegetation. The results suggest that neither the nature of the parent rock nor the climate is in itself a severely limiting factor, and that if the podzol and its associated flora can be changed, there should be little difficulty in growing perhaps even relatively demanding trees; such have indeed grown there in the past. It has been demonstrated that on these moors, the reversion of the podzol to a brown forest soil is a naturally occurring process under birch; probably other species equally effective could be introduced. The crucial feature of this change is the contrast between the accumulation of organic matter as raw humus at the surface of the podzol and the intimate biological mixing of the humus with mineral soil in the brown forest soil, a mixing which cannot be brought about by mechanical means, though these may assist the change, given the

correct tree species. This change is of particular significance in the water-retaining capacity of the soil, a factor regarded as of major importance on these moors.

In connection with these findings, a new field experiment has been set up to test the possibilities of other hardwoods as soil-regenerating species. At the end of the first season, an encouraging report on the establishment of over a dozen species can be made. Further species are to be introduced in the coming year.

Work on the nutrient uptake by birch on these soils is continuing and to date has produced some unexpected trends, which, however, remain to be checked. Parallel observations are being made on pine.

The intensive soil studies have revealed some interesting and unexpected features of the glacial history of these moors. These observations will be published in detail elsewhere.

The supervision of the experiment mentioned in the last annual report, for the study of the effect of sawdust on the establishment of birch on unploughed land has been very satisfactory: the seedlings have now been thinned. It is, however, much too early yet to look for results.

Tree Physiology. Besides giving a course of lectures as last year, Dr. L. Leyton continued his investigations into the growth and mineral nutrient relationships of trees, particular attention being paid to plantations on *Calluna* dominated sites.

In November, 1949, first samplings were made from the experimental plots laid out in Scotland and Yorkshire to follow the effects of screefing and graded applications of phosphatic fertilizer on the growth and nutrition of Sitka spruce and pine (Scots and Corsican). The results obtained so far suggest that whilst phosphorus deficiencies are contributory factors to poor growth on these soils, the growth of spruce is more intimately related to nitrogen status. A close relationship has been established between *Calluna* and the nitrogen nutrition of spruce but not with that of the pines. This is undoubtedly connected with the rooting habits of the species concerned: spruce and *Calluna* tend to exploit the same horizons of the soil whereas the pines root more deeply. Even after five months, screefing has resulted in significant changes in the manganese and potassium status of the trees.

These results were presented in a paper to the Seventh International Botanical Congress at Stockholm in July, 1950. A second sampling has been planned for the end of the 1950 growing season.

As part of a general programme to investigate more thoroughly the nutritional relationships in these heathland sites, a detailed study by a research student, Mr. H. S. Yang, was directed to the nutrient status of *Calluna vulgaris* growing on different sites and in different communities on heathlands near Newbury and Farnham. Significant differences were found in the N and P content of the foliage according to site, and work is continuing to test the possibility of using this plant as an indicator of site fertility.

Microbiology. Dr. W. R. C. Handley has continued the investigation of the mechanism of raw humus formation, as outlined in the 1948-49 report. From the results so far obtained, it seems probable that raw humus is associated with the formation, in the dying leaf, of a protein complex which is resistant to decomposition under some conditions. It is likely that these complexes have a variable resistance to breakdown depending on the kind of micro-organism, the environmental conditions in the surface layers of the soil and the plant species from which the complexes originate. Up to the present gelatin has been used in the formation of experimental protein complexes but it will now be possible to use leaf proteins."

SOIL SCIENCE

Dr. E. W. Russell and Mr. G. R. Clarke of the Soil Science Laboratory gave special courses of lectures for forestry students as usual.

Physico-chemical properties of forest soils. Mr. P. J. Rennie continued his investigations on the moorland soils of Allerston Forest in Yorkshire, particularly on porosity and air and water content, and the nutrient content of the various soil horizons and types of litter.

The kerosine immersion method of Russell and Balcerek was found to be very satisfactory for determining soil porosity and water content but time consuming. The latter objection was to some extent overcome by using a large low pressure chamber capable of holding 15-20 specimens. Data have been obtained at approximately two-month intervals for nine sites with different vegetation and methods of soil working: these data are being analysed.

The chemical analyses have demonstrated the high concentration of nutrients in the surface peat where calcium, phosphorus and potassium content is ten, five and two times as great respectively, as in the sub-soil of Lower Calcareous Grit. The leached layer is very deficient in nutrients. The nutrient content of the litter formed by Sitka spruce planted on this soil is much higher where the trees are growing well than where growth is poor, thus the figures for calcium were respectively nine and two milligrams per gram of litter.

Soil Fauna. Mr. P. W. Murphy has continued his work on the mesofauna of the same Yorkshire moorland soils as have been studied in other aspects in the sections reviewed above. Much of his time has been devoted to identification and counts of the forms present in the undisturbed moorland, with a view to determining their numbers and distribution throughout the profile at different times and conditions. It is found that the *Acari* in these soils tend to be much smaller than in other habitats that have been reported on. On afforestation there is a tendency towards a richer fauna and larger size; also towards a much greater proportion of Oribatid mites and fewer Trombidiformes. The help of Dr. G. O. Evans of Rothamsted Experiment Station is gratefully acknowledged, as is also the help in identification by Mr. Turk.

Some work was done with the improved extraction funnels which permit of treating samples under more closely known and controlled conditions of temperature and moisture, but further tests are needed for the assessment of comparison of results on the same soil samples with the old and new apparatus.

It has been possible with the collaboration of Dr. Evans to start some studies on culturing some of the mites, and it is hoped to get some quantitative data for their feeding habits.

FOREST BOTANY

The Forest Herbarium, though a part of the Department of Botany, is still kept at the Institute. Professor T. G. B. Osborn has transmitted the following report on the work of the year.

'Mr. A. C. Hoyle continued as Curator of the Herbarium and after his return from a seven months' study tour in East Africa, from June, 1949, to early January, 1950, gave the usual courses in Systematic Botany during Hilary and Trinity terms. The usual textbook being now out of print, it had been decided during 1948-49 to provide students with duplicated drawings illustrating a modified form of Engler's classification. Much of this drawing was finished during 1948-49 by Mr. A. Corney under Mr. Hoyle's direction and was continued during 1949-50 by Mr. Hoyle with the help of Mrs. V. Reade. This work, with teaching and routine administration, occupied all the time available, preventing further progress in writing up Mr. Hoyle's revision of *Brachystegia* until after Trinity term.

While in Tanganyika Territory in 1949 Mr. Hoyle travelled and collected for seven weeks with Mr. P. J. Greenway of Amani and officers of the Tanganyika Forest Department and Tsetse Research Department; in N. Rhodesia he joined Mr. C. G. T. Morison, Dr. J. Hope Simpson, Mrs. B. I. Wright, Mr. J. Chance and officers of the Departments of Agriculture and Forests for three months in detailed soil-vegetation studies in several areas; afterwards he returned through Tanganyika and Kenya to Uganda, travelling and working alone or with various members of the Forest Departments. During this extensive tour many valuable contacts were made and useful discussions held, and every opportunity was taken of obtaining first-hand knowledge of the vegetation types and of the variation of species, especially of *Brachystegia*.

The number of specimens (400) collected was not large, emphasis being placed on full field notes, especially of bark characters, and numerous photographs were taken of species and of vegetation types. Special attention was paid to some timber trees at the request of the Tanganyika Forest Department. The tour was made possible by a grant from the Colonial Development Fund and by the courtesy and generous aid of the Colonial Departments.

The Herbarium received during the year 1,400 specimens (as well as part of Mr. Hoyle's collection), notably a large and valuable collection of 225 named Congo duplicates from the Jardin Botanique

de Bruxelles, two large consignments from the Tanganyika Forest Department totalling 428, and 73 Brachystegias from new areas sent by the Department of Agriculture, Portugese East Africa. Many were already partially mounted, and when 926 worth retaining among the remainder had been mounted, the mounting was brought almost up to date. Advantage was taken of this temporary lull to ensure the safety and improve the usefulness of the carpological collection by a long-overdue poisoning and re-labelling (by Mr. Corney), and to begin a general repair of the mounted material already filed. The current filing of specimens was brought up to date, almost entirely by Mr. Corney and later by Mr. V. W. Pearson, helped by a temporary assistant, all members of the Identification staff of the Department of Forestry.

Mr. C. J. W. Pitt, on transfer from the Tanganyika Forest Service to the Gambia, worked in the Herbarium for a short time. The usual series of enquiries, some very time-consuming, have been received from the Forest Products Research Laboratory and from timber firms and private individuals.'

Mr. F. White continued as Forest Botanist. In October Mr. A. Corney resigned from his post as Herbarium Assistant and was replaced by Mr. V. W. Pearson. A temporary junior assistant, Mr. M. Castell, was employed for six months from September to March. During that time all but a small part of the arrears of filing were incorporated into the Herbarium.

A total of 1,013 specimens were received for determination during the year from the following territories: Gold Coast (27), S. Rhodesia (103), Sudan (236), Tanganyika (599), Uganda (48). About 2,000 specimens from Bechuanaland, the Gold Coast, Nigeria, N. Rhodesia, S. Rhodesia, Tanganyika and Uganda were identified. Most of the great quantity of material received since the end of the war has been determined by now. There remain about 850 specimens, belonging to critical groups, requiring careful study, and about 400 sterile specimens.

An account of five West African species of *Cissus* Linn. was prepared and accepted for publication, and is now in the press. The genera *Maba* and *Pterocarpus* have received special attention. The collection of plants brought back last year from Mt. Kenya by Mr. White have been sorted and arranged in families and some specimens have been identified.

Two probationer forest officers worked on special problems under Mr. White's supervision. Mr. R. A. Ayliffe (Trinidad) identified a large collection of Trinidad *Loranthaceae* which he had brought back with him, and worked out the correct nomenclature of the West Indian species so far as this was possible. Mr. G. J. Leggat (Uganda) made a field key to the Uganda species of *Ficus*.

Work on the N. Rhodesian Check List, for so long held up by the demands made by the identification service, was restarted during the year.

After the end of the year, Mr. Angus was appointed to assist in this work under a special grant from the Colonial Development and Welfare Fund.

FOREST PATHOLOGY

Mr. W. R. Day continued in charge of the Section, with Mr. F. H. Jones as senior assistant and Mr. D. K. Barrett and Mrs. Hollely as junior assistants. Mr. Jones's work as Chief Laboratory Assistant as before occupied the major part of his time.

Teaching. The usual courses of instruction were given for the final schools and the short special course of lectures in forest hygiene was given to Institute students.

Research. (1) *Root disease of conifers with special regard to the dying of Sitka spruce and its liability to windthrow.* Field investigation of small areas of diseased Sitka spruce in the Forest of Dean was continued in collaboration with Mr. T. R. Peace, Pathologist, Forestry Commission. This work was directly in charge of Mr. F. H. Jones. It confirmed previous observations that (*a*) an extensive dying-back of the root system takes place before there is any obvious sign of disease in the crown; (*b*) an undue decrease in the rate of height growth is usually the first sign that the root has become diseased; thinning of the crown and loss of foliage, follows afterwards, and by then root disease is already very advanced; (*c*) none of the known root parasites occur on the affected root systems. The trees grow on a freely draining loam of about 24 inches in depth and overlying a compact, hard, but not impermeable subsoil which is mainly impenetrable to roots. The indications are that the soil supply within this limited rooting space becomes inadequate when the trees reach a size of between 40 and 50 feet in height and that the dying of the root and the generally diseased condition of the trees are caused by this.

Further opportunity for the study of this problem occurred in the spring of 1950 when Kyloe Woods in Northumberland, and various plantations in Liddlesdale were visited, with the permission of their owners, Major Mitchell and the Duke of Buccleugh respectively, in order that a report might be made to the Forestry Commission as to the condition of the Sitka spruce. The plantings in which interest centred grow on soils which permit only of the permanent development of a shallow root-system and usually consist of peat, at least in their upper layers. These shallow rooting soils are so limited in space for root development and, related to this, in the supplies essential for healthy root growth as the trees grow to a large size, that root disease begins to develop relatively early, especially with fast-growing species such as Sitka spruce. The obvious signs of debility are a marked thinning of the crown and a premature drop in rate of height growth. When the trees grow on sites in which limitation of supplies to the root is very marked, death may soon result. Extreme seasons, such as the markedly dry summer of 1949, favour the development of disease, and affected trees are very liable to be thrown

by strong winds. This susceptibility to windthrow is increased in those situations in which the surface drainage through the shallow easily rootable soil is slow, so that a water-logged condition arises during periods of high precipitation, or when snow is melting. The report on this study was sent in during the summer.

(2) *The drought-crack of conifers.* The considerable amount of work needed to prepare a report on this work was finished towards the end of the year.

(3) *The fungus flora of live spruce stems.* There was a further and interesting development in connection with this investigation of drought-crack. Isolations made from affected trees showed that their wood is always colonised by fungi, some of which are Hymenomycetes known to cause a decay of timber. Most, so far, have proved to be either Ascomycetes or *Fungi Imperfecti*. The species in these two groups include a number of mycelia capable of causing blue, grey or reddish staining of the wood within which they grow. In view of the discovery that trees which show no detectable injury to their main stems or branches may have fungi in their heartwood, an examination was made of the heartwood of trees which had not suffered from either drought-crack or other known injury, but which grew among drought-cracked trees, for the presence of fungi. A test carried out in Radnor Forest in four plots of Sitka spruce of different seed origin, showed that fungi were probably present in the heartwood of all the trees, although the distribution of mycelium was not nearly so extensive as in trees which had suffered drought-crack. The same general classes of fungi occur and while the infection of the wood of drought-cracked trees could have taken place through the open cracks, it might easily have developed by the extension of mycelia already established within the tree before cracking took place.

Another point of interest arose from the sampling of the wood of the main stems of the Norway spruce, in Drummond Hill Forest, by Mr. J. Farquhar, reported last year. The principal mycelium in the trees which had suffered from bark necrosis has proved to be a species of *Nectria*. Again it might easily be that infection with this fungus took place after the death of the bark on the main stems sampled. But this same species has been isolated, in more than one case, from Sitka spruce which had suffered no known injury on their main stems. Here also the infection of the heartwood could have taken place before the main stem was injured; moreover it is clear that any extension of the mycelium to dead areas of bark with the subsequent development of fructifications, could also have taken place from this pre-existing infection within the wood.

Sitka spruce within and outside dying patches in a Liddlesdale plantation were also sampled for the presence of mycelium in the heartwood. Again infection was found to be present; but it was most abundant in the still apparently healthy trees outside the dying groups. No dead trees were sampled.

It would appear that infection of this type, which occurs before any large side branches have developed, become injured mechanically,

or died, must take place through the suppressed side branches on the lower part of the stem or through their stubs after brashing. The suggestion is that the extent of development of the mycelia which enter in this way, depends largely on the condition of the tree and is less in healthy vigorous trees and those that are dying and drying out, than in any that are merely in a low state of vigour.

(4) *The silviculture and pathology of European larch.* During the last two years an attempt has been made to determine the incidence of fungi in the initial bark injuries, as well as in new extensions of the developing cankers which occur on larch branches. This work indicates that freshly dying or dead tissue in which the colour change which occurs upon death is not yet complete, is sterile. Infection with fungi and to some extent bacteria, takes place fairly rapidly, especially when the extension of a canker is taking place and fungus mycelium exists in the neighbouring dead tissue. Much of this mycelium belongs to species of fungi other than *Dasycypha willkommii*, the larch canker fungus. Even when a canker is already colonised by *D. willkommii*, freshly dead bark is sterile, or, if already infected at the time of sampling, may contain the mycelium of other species. This work supports the now generally accepted conclusion that frost is the important killing factor in canker development, and it also shows that, as is usually found when a non-parasitic factor is the killing agent, colonisation of injured bark is not confined to one species of fungus, even though this may eventually become the dominant and obvious inhabitant. This work has been carried out in North Wales.

(5) *The death of beech bark on trees in canopy.* Similar sampling has been carried out in Bagley Wood in connection with the death in patches of the bark of the main stem of beech trees. This bark necrosis of beech is well known; the dominant fungus in the wood beneath the dead bark is eventually *Polyporus adustus* which rots the wood and causes the so-called 'Snap-Beech' disease. These observations need to be carried further, but the indications are that often at least, freshly dead bark is sterile; abundant infection with bacteria may occur quite early and before the discoloration associated with death has fully developed; mycelium ultimately occurs in abundance in the necrotic areas, a number of species one of which is a *Nectria* being represented. The suggestion here is that the colonisation of beech bark follows a course similar to that which occurs in the colonisation of the bark of larch in necrotic areas.

The field work and management of cultures in connection with this work, both on larch and beech, has been in charge of Mrs. Hollely.

(6) *Other items.* An interesting case was investigated in Wiltshire, in which Douglas fir and European larch growing on Greensand had died or had become thin in the upper crown. There was a shallow upper layer of soil which permitted of free rooting; this overlay a great depth of obscurely fissured compact sand which roots had penetrated deeply. There was clear evidence that in this compact sand, which contained the major part of the root systems, there has

been a general dying of the ends of the finer roots so that the trees had been compelled to depend mainly on the part of the root system formed within the shallow loose surface soil. Moreover it was clear that the compact sand at times became badly aerated. The death of trees, or the yellowing and thinning of the crowns, was thus to be accounted for by deficiencies in supply of oxygen and water associated with wet and dry periods and made possible by the constitution of the soil. This is, in fact, a parallel case on a very different soil type to that of the disease of Sitka spruce mentioned above.

Another case of considerable interest was the dying back of the crowns of both Japanese and European larch growing on calcareous soils in one of the ravine-like valleys in the Cotswold Hills. The European larch was affected in the ordinary way, by frost injury which had occurred mainly in the spring causing a dying-back through the girdling of branches at some point within the crown and not on its surface. The Japanese larch, on the other hand, were dying back owing mainly to autumn frost which had caused injury to the ends of the branches. A similar case was noticed in the Report for 1946-47, at Fontmell Hill, in Dorsetshire. A short note has been published recording these occurrences.

A short tour of considerable interest was made with Mr. T. R. Peace, Forestry Commission, to inspect Ink Disease of Sweet Chestnut in the New Forest and the Isle of Wight.

Other Matters. During the year, more time than usual was taken up by the preparation of exhibits for various meetings. Special acknowledgment is made of the enthusiastic and intelligent support from the assistant technical staff of the section mentioned above.

FOREST ENTOMOLOGY

Dr. R. N. Chrystal continued in charge of the Section with Mr. E. R. Skinner as his assistant. In January, 1950, Mr. G. H. Thompson, Assistant Conservator of Forests, Gold Coast, was appointed Assistant Entomologist.

Teaching. Courses of instruction in Forest Zoology were given in Hilary and Trinity terms, together with field demonstrations. Instruction in Forest Entomology was continued at the Forestry Commission's Forester Training Schools at: Parkend, Forest of Dean; Lynford Hall, Norfolk; Capel-Curig, North Wales. In addition, the two Scottish Schools, Glentress, Peebles, and Benmore, Argyll, have now been brought within the scope of this scheme as from September, 1950.

Research. (1) *Douglas Fir Adelges.* Continued observations on the pruning experiment in the Coed-y-Brenin forest showed that the trees in the pruned areas have suffered no check of growth as a result of the pruning carried out during the summer of 1947.

The assessment work at Tubney commenced last year, showed that the trees which in general have sustained a heavy population over a number of years, have not only retained their needles as long as unattacked trees, but have also shown no loss of height growth.

Pruned trees likewise showed no loss of height growth even when their lower branches were bearing a heavy population of *Adelges*. Needle recovery after attack is so complete that the trees cannot have been significantly weakened in vigour by *Adelges* attack. This plantation has been under observation since 1943 when the trees ranged between 4 and 6 feet in height ; the height at the present time is between 27 and 36 feet.

The experimental plots at Kennington which were used for studies in population movement and migration have been examined this season. It was found that trees which had been infested to the heaviest possible extent did not show any marked loss of vigour as compared with control trees.

Further work in the plot is to be discontinued as the trees have now outgrown their experimental use.

(2) *Alder Woodwasp, Xyphidria camelus* L. Certain aspects of this investigation have been continued this year and the biology of the *Pteromalus* parasite further elucidated. It is hoped to publish an account of this work.

(3) *Clay Weevil. Otiorrhynchus picipes* F. A further visit was paid to Ashbourne, Derbyshire, in connection with an outbreak of the clay weevil (*O. picipes*). This is being investigated in collaboration with Mr. A. Bayne, Forester to the Shirley Park Estate Co., Ashbourne. The attack was much reduced this year, and from studies made by Mr. Bayne, certain new observations on the breeding and hibernating habits of the insect have been made. A short account of these investigations is in course of preparation.

MANAGEMENT

Mr. N. V. Brasnett and Dr. M. L. Anderson gave the customary lecture courses to the junior and senior undergraduates.

For the preparation of working plans, the change over was made this year from the Forest of Dean to the New Forest and the season for the first part of the work was also changed from the Easter vacation in the first year to the following September. The New Forest area selected for the plans was 620 acres in Knightwood Enclosure, and 27 students working in groups of three or four spent four weeks on the examination, description and enumeration of the woods. After the resultant reports had been examined and returned to them, they spent a further fortnight on the area during the Easter vacation and submitted their completed plans at the beginning of the following term.

The assistance rendered by the British Forestry Commission, which included the supply of information about the New Forest, talks given to the students by the Deputy Surveyor and his staff and by the retired Deputy Surveyor (Mr. D. W. Young), and the provision of the excellently managed facilities of Northerwood House is gratefully acknowledged.

Four probationary officers who had prepared the first part of their plans in High Meadow Woods before going out to their Colonies went back to Staunton for a fortnight in the Easter vacation to complete their Part II work.

The junior students, together with some of the seniors who had not been able to join the previous year's party, toured in Normandy and the Landes for ten days of the Easter vacation studying primarily French silvicultural practice and methods of forest management. Belgian forest management was seen by the senior students during their Continental tour in July. Two colonial officers attending special courses included the study of management of tropical forests in their work, and one completed the revision of a current working plan for a tropical forest from data he brought home with him.

A forest officer from Western Australia studied European forest management during the Trinity term at Oxford and for two months in French forests during the long vacation.

Not many copies of new working plans were received during the year, but among them three from New Zealand, each dealing with a different type of problem, were particularly welcome.

Dr. M. L. Anderson continued work on the preparation of a working plan for Bagley Wood. Work in Wytham Woods is being done according to the plan he completed last year.

MENSURATION

Teaching. The usual courses in Mensuration, with practical work in Bagley Wood were run by Dr. M. L. Anderson for the junior year.

The senior year's practical work included the establishment of two new sample-plots in sycamore and Norway maple in Bagley Wood and the re-measurement of three other plots of Douglas fir, Japanese larch and Western hemlock.

The usual series of twelve lectures on selected points in Forest Mensuration, including enumeration methods, was given to advanced students.

STATISTICAL SECTION

Mr. M. R. Sampford gave a course of lectures on Elementary Statistics for Forestry Students and Mr. D. J. Finney's lectures were available for the more advanced students.

There has been a continuous demand for the services of the Computer, Miss J. Smith, throughout the year, and there is ample evidence that the maintenance of this post is warranted. Miss Smith has performed her duties conscientiously and with satisfaction.

WOOD STRUCTURE

Dr. L. Chalk continued in charge of the Section with Mr. A. A. Shaw as senior assistant. Mr. P. G. H. Franklyn rejoined the Section after completing his military service.

Teaching. The usual undergraduate and post-graduate courses were given. The course for Colonial Forest Officers in the Trinity term was held in the Wood Structure Laboratory of the new building.

Research. The *Anatomy of the Dicotyledons* by G. R. Metcalfe and L. Chalk was published during this year. Very little time was available for research owing to the move and demands made on Dr. Chalk's time in connection with the gift timbers in the building.

The move to the new building makes it possible to deal with various collections of wood specimens that have been more or less inaccessible owing to lack of shelf space. There is a great deal still to be done on these before the work on the wood collection will be complete. Much work also remains to be done in organising teaching sets for different countries so that the main collection can be free from demands for material for use by students.

Dr. Chalk himself moved in after Easter, but the rest of his staff and material did not change over till after the summer term.

Dr. Chalk organised and was Chairman at a meeting of the International Association of Wood Anatomists in Stockholm during the Seventh International Botanic Congress, which he also attended.

FOREST ECONOMICS

Mr. J. J. MacGregor continued in charge of the Section with Mr. F. E. Balman as assistant.

Teaching. As in previous years, courses of lectures and tutorials were provided on general economic theory and forest economics for the second year students. A course was arranged for the optional subject of 'British Forest Law, Land Tenure and Taxation.' Seminars based on study groups covering the main economic problems of individual colonies were arranged for the Colonial Probationary Officers.

A Bibliography on Forest Economics was prepared for the use of students.

Research. The analysis of the financial records of woodland departments on private estates has been continued during the year. Studies on the price trends of some standardised types of home grown timber and of different categories of imported timber covering the period from 1914 to 1949 were published in the *Journal of the Land Agents' Society*. Investigation on certain aspects of Britain's forest policy was continued. Opportunity was taken whilst attending the International Conference of Agricultural Economists at Stresa to study systems of forestry taxation in Italy and, later on, in Switzerland.

The Forest Economist acted as secretary for the Costings Committee of the Royal Forestry Society of England and Wales, and also attended several meetings of the Forestry Study Group of the Imports Substitution Panel of the Cabinet Committee on Industrial Productivity.

COLONIAL FOREST ADMINISTRATION

The course on this subject given by Mr. Brasnett during the Hilary and Trinity terms was well attended by Colonial Officers, Probationers, and Senior Students hoping to join the Colonial Forest Service. Fifteen students satisfied the examiners in the optional paper in the Honour School.

Several of the discussions by the Colonial Officers' Group dealt with administrative subjects and the information provided by officers with practical experience of the latest developments in many Colonial territories was of great value to the teaching staff.

FOREST ENGINEERING AND UTILISATION

Teaching. Degree Course lectures were given as usual by Colonel A. H. Lloyd to first and second year students; and twelve lectures to Forest Officers and Probationers on modern methods of timber extraction and conversion, including sawmilling and other woodworking machinery. Practical engineering work, including road alignment, was carried out at Wytham where a demonstration was also given of mechanical excavation for drainage.

Extraction and loading of logs up to three tons in weight by winch from four-wheel-drive tractors was demonstrated at Wantage by Unipower Tractors Limited, and the uprooting of trees by Trewhella winch at Bagley Wood. A 'one-man' power driven chain-saw for cross-cutting and felling of small timber was also shown in operation. Forty-two Colonial Forest Officers and second year students attended a comprehensive course at the Forest Products Research Laboratory. Demonstrations and lectures were given in timber testing and mechanics, sawing and woodworking, kiln-drying, plywood, wood preservation and wood chemistry.

A new type of portable horizontal band-saw was seen under test at the French Colonial Forest Products Research Station at Nogent-sur-Marne. The saw operated on the principle that it is easier to feed a light saw to a heavy log than to feed the log to the saw. It has already proved its value for breaking down heavy tropical timber in the Belgian Congo, and it appears probable that under favourable conditions it may replace pit-sawing in the future.

Local excursions, etc. Visits were made by Forest Officers and students during the year to the railway sawmills and timber yards at Swindon, the Imperial Institute (for Minor Forest Products), Gliksstens' and Mallinsons' sawmills in London and to furniture factories in High Wycombe.

Study of timber extraction by cableway. Colonel Lloyd visited the Wyssen cable installation in Switzerland in April with the Chief Experimental Engineer of the Forestry Commission and two Indian officers. A demonstration of the same cableway was also given to Colonial Forest Officers and Probationers in the French Vosges where large silver fir logs were being extracted. There has been wide interest in this system and special demonstrations have been arranged

for Forest Officers from Nyasaland and from the Sudan. The early installation of a new heavy type of Wyssen cableway (to take hardwood logs up to two tons) is now under consideration in both these countries.

FOREST PROTECTION

A course of lectures was given by Colonel A. H. Lloyd on soil conservation and fire protection to first year students.

SURVEYING

Mr. A. R. Robbins, University Lecturer in Surveying, gave the usual course in Surveying in the Trinity term. He also gave a joint course with Mr. Dimbleby on aerial survey as last year.

LIBRARY

The Library staff consists of Miss G. Guiney, Librarian; Messrs. Smythies and Hemmings, Assistant Librarians; Miss Powell and Mrs. Dienemann.

Accessions during 1949/50

Issues of periodicals	1632	(1528)
Books	223	(191)
Other items	1285	(1159)
Total	3140	(2878)

Notes (1) Figures in brackets are those for the preceding year.

(2) The Brooks Memorial Fund provided six books of special value; 210 items were given by the Commonwealth Forestry Bureau, and 137 by various institutions on request. Several books that were published in Germany during the war but had not been obtainable hitherto were purchased.

Loans:

To Staff	2434	(2832)
To Students	2075	(1911)
To the Bureau	713	(847)
To Visitors and Correspondents	484	(571)
Total	5706	(6161)

Note: The main reason for the reduction in numbers of loans to all groups was that the Library was largely out of use during the period of the move.

The chief outside borrower continues to be the Ministry of Defence.

Visitors included persons from Australia, Burma, Costa Rica, Denmark, Fiji, France, French Equatorial Africa, Germany, Holland, Israel, Jamaica, Norway, Pakistan, Portugal, Sweden and the United States.

New Periodicals. Eight new titles were added, one English, and one each from Austria, Denmark, France, Germany, Italy, Trinidad and Yugoslavia.

New Series. Thirty-four new headings bring the total to 2,492, about 910 being current.

Correspondence. Sent, 1,667; received, 1,063.

Library sales:

Institute publications	£387	3s. 0d.
Books and pamphlets resold ...	£27	16s. 4d.
	£414	19s. 4d.

Note: Last year's total sales came to £90. The very marked increase was caused mainly by the sales of the *Tanganyika Check List of Trees and Shrubs.*

During July the Library was closed for a fortnight, while its contents were moved into the new building. The actual move was effected in 3½ days, the remaining time being taken in rearranging and re-labelling under a greatly improved system.

The recently published *List of Periodicals and Serials received in the Library* continues to be in demand. It is being used by the editors of the valuable *World List of Scientific Periodicals* who are preparing a new edition and to whom about 50 additional cards have been sent. Cards for the German Union Catalogue are now nearly up to date, and it is hoped to keep this information current. Data for Russian Union Catalogue will be gathered by a member of the National Central Library staff who will visit Oxford for the purpose.

The work of the Library staff, apart from the daily routine and special activities outlined above, consists in no small degree in maintaining contact with libraries and institutions, British and foreign, in the ceaseless quest for new material and lacunae. Publications from these sources are acquired chiefly by request and (usually) exchange. A reprint collection, suitable for use in exchange for single items, is being formed.

Catalogue Room. Mr. Hemmings continued in charge. As it was believed that a revised classification was about to be introduced, it was decided to close up the current card catalogue. Unfortunately, the new scheme has not yet been adopted, with the result that the catalogue is now in an overcrowded state, and a lot of work will be involved in readjusting it.

Increasing use is now being made of the Bibliography, notably by more of the students.

Figures for 1949-50 accessions are the highest ever recorded. 15,983 cards were filed, to compare with 13,207 in 1946-47, 14,584 in 1947-48, and 13,675 in 1948-49. It is no longer possible to ascribe the increase to pre-war arrears. So much literature on Forestry is now being published that some system of segregation or restriction may have to be adopted if the index is to continue to supply quickly and simply the needs of those using it.

Gifts. Notable amongst these during the year were: The *Anatomy of the Dicotyledons*, by G. R. Metcalfe and L. Chalk, presented by Dr. Chalk; and a two-volume history of the Danish Forestry Society, 1898-1948, presented by the Society; Vol. 2 (completing set) of Schiffino, J. *Riqueza forestal Dominicana*, given by the Minister Plenipotentiary of the Dominican Republic, London. A number of other welcome items were presented by Dr. N. Polunin (Professor of Botany, McGill University), the Royal College of Veterinary Surgeons, the Librarian of the Department of Agriculture and several members of our staff. To all donors grateful acknowledgment is made.

PHOTOGRAPHIC SECTION

The demands on the Photographic Section have again been fairly heavy, including exhibition prints for the Royal Show, and preparatory work for the Department's Opening Exhibition. Also, a large amount of film processing work has been done for the Expedition to East Africa.

The main items of processing include 3,227 negatives, 3,370 prints of all sizes, 116 lantern slides and a number of measuring graticules, aerial survey scaling transparencies and other such miscellaneous items. The addition of a vertical enlarger to the equipment has made for much greater efficiency in dealing with the greater number of small miniature negatives now being used.

The increased working space and improved layout of the Photographic Department in the new building, have proved very helpful, especially with regard to photo-micrography and the preparation of large size prints. Work in connection with the photo collection has been proceeding steadily and many new photographs have been added. The section has also been responsible for the duplicating work of the Department, which has increased to nearly twice last year's output.

WORKSHOPS

The workshops continued with a full-time metal worker, Mr. E. J. Howell and a full-time wood worker, Mr. J. Howkins. The demand on the workshops has been greater than ever, and the departmental exhibits for the opening of the new building have called for much of their time.

The following pieces of apparatus have been constructed in addition to routine work and numerous smaller items:

Stevenson's screen
Trolleys for new building
Photographic printing box
Model of planted hillside in Wales
Planting racks and pegs
Kjeldahl stand (24 burners)

FINANCE

The audited accounts of the Department will be published in the *Oxford University Gazette*. The following is a summary of income and expenditure for the year.

GENERAL ACCOUNT

Income. Forestry Commission, General Education, £8,142; Forestry Commission, Special Grants, £4,098; Colonies, £4,940; Colonial Development and Welfare Fund, £9,893; Curators of the University Chest, £12,066; Dominions, India and others, £1,180; other receipts, £530; *Total Income*, £40,849.

Expenditure. Staff salaries and pension contributions, £31,606; Instructional supplies, £1,988; Furniture, £37; Travelling, £1,398; Administrative and miscellaneous expenses, £2,338; Library expenses, £567; Publications, £773; *Total Expenditure*, £38,707.

CAPITAL ACCOUNT

There is held in Capital Account the sum of £11,988. The income for the year from investments was £259.

PUBLICATIONS

GENERAL

Original Papers

Forest Notes from Holland, by H. G. Champion. Empire Forestry Review, Vol. 29, pp. 20-27, 1950.

Are we ready for Working Plans? by H. G. Champion. Sylva (in Press).

Contribution of Oxford to Forestry, by H. G. Champion. Farmer and Stockbreeder (Royal Show Number).

Tree Breeding and Seed Supplies in North-West America with special reference to Douglas Fir, by H. G. Champion. Forestry (in Press).

The Imperial Forestry Institute, by H. G. Champion. Oxford, 10: pp. 64-68, 1950.

The Third World Forestry Congress, by H. G. Champion. Empire Forestry Review, Vol. 28: pp. 361-363, 1949.

Visit of German foresters to the United Kingdom, by H. G. Champion. Empire Forestry Review, Vol. 29, pp. 98-99, 1950.

Twenty-fifth Annual Report of the Imperial Forestry Institute.

Forestry Developments in Great Britain, the Commonwealth and Europe in 1949, by A. H. Lloyd. Encyclopaedia Britannica 'Book of the Year' for 1950.

State Control of Private Forestry under European Democracies, by M. L. Anderson. Oxford Forestry Memoir No. 22.

Reviews

Douglas of the Fir. A Biography of David Douglas: Botanist and Traveller, by A. G. Harvey. Cambridge, Mass. Nature 163: p. 80. (*H. G. Champion.*)

Administration Reports: Nyasaland Protectorate, 1948; *Tanganyika Territory*, 1947; *Uganda Protectorate*, 1948. Empire Forestry Review, Vol. 28, pp. 386-390. (*N. V. Brasnett.*)

Northern Rhodesia, 1927 *and* 1948. Empire Forestry Review, Vol. 29, pp. 80-82. (*N. V. Brasnett.*)

SILVICULTURE

Original Paper

Some aspects of natural regeneration in the Benin rain forest, by E. W. Jones. Empire Forestry Review, Vol. 29, pp. 108-124, 1950.

ECOLOGY

Original Paper

Air Photographs and Forestry, by G. W. Dimbleby. Wood, Vol. 14, Nos. 11, 12, Vol. 15, No. 1.

Review

Britain's Green Mantle, by (Sir) A. G. Tansley. Empire Forestry Review, Vol. 29, pp. 155-156. (*G. W. Dimbleby.*)

FOREST PATHOLOGY

Original Papers

Forest Hygiene: 1. The Conception of Health and the Character of the Forest in Relation to Health, by W. R. Day. Empire Forestry Review, Vol. 29, 3, pp. 204-210, 1950.

The Soil Conditions which determine Wind-throw in Forests, by W. R. Day. Forestry, Vol. XXIII, pp. 90-95.

Cambial Injuries to the Bark of Norway Spruce, by W. R. Day. Forest Record No. 4, H.M.S.O., 1950.

Frost as a cause of Die-back and Canker of Japanese Larch, by W. R. Day. Quar. Journ. For., XLIV, 2, 1950, pp. 78-82.

Report on the Growth of Sitka Spruce in Kyloe Woods, near Belford, Northumberland and in various plantations near Canonbie, Dumfrieshire, with special reference to the Causes of Thinning of the Crown, Death and Wind-throw, by W. R. Day. Report to Forestry Commission, 1950.

FOREST MANAGEMENT

Original Papers

Some Problems of Sustained Yield Management in the Colonies, by N. V. Brasnett. Empire Forestry Review, Vol. 29, pp. 9-12.

The Brandis System of Yield Regulation, by N. V. Brasnett. Accepted for publication in the Oxford Forest Society Journal, Third Series, No. 5.

Reviews

La Reconnaissance Méthodique des Forêts Tropicales par Quadrillage, P. Allouard; Bois et Forêts de Tropiques, No. 11/13, 1949, pp. 277-287. In the Empire Forestry Review, Vol. 29, pp. 73-74. (*N. V. Brasnett.*)

Méthodes de Reconnaissance Rapides de Forêts Tropicales, by P. Foury; Bois et Forêts de Tropiques, No. 13/1, 1950, pp. 16-23. Accepted for publication in the Empire Forestry Review, Vol. 29, p. 277, 1950. (*N. V. Brasnett.*)

FOREST MENSURATION

Original Paper

The Selection of Tree Species, by M. L. Anderson. In the Press. Oliver and Boyd, Edinburgh.

Translation

Northern Coniferous Forest Soils. Translation of a work by O. Tamm, by M. L. Anderson. In the Press. Scrivener Press, Oxford.

Reviews

On establishing a Uniform Scale of Productivity-classification, etc., by Hans Ostwald. Empire Forestry Review, Vol. 29, No. 2, pp. 173-4. (*M. L. Anderson.*)

WOOD STRUCTURE

Original Publication

Anatomy of the Dicotyledons, by G. R. Metcalfe and L. Chalk. Clarendon Press, Oxford.

FOREST ECONOMICS

Original Papers

The Price Trend of Some Categories of Home-Grown Timber, 1914 to 1949, by J. J. MacGregor, Journal of the Land Agents' Society, Vol. XLIX, May, 1950, pp. 173-75.

The Trend of Prices and Volume of Imported Timber, by J. J. MacGregor. Journal of the Land Agents' Society, Vol. XLIX, June, 1950, pp. 241-46.

Reviews

The Economic Problems of Forestry in the Appalachian Region, by W. A. Duerr, Harvard Economic Studies, Vol. XXIII, No. 1, pp. 63-65. (*J. J. MacGregor.*)

An Examination of the Accounts for the Year 1947-48, *Dartington Woodlands, Ltd.*, by W. E. Hiley. Accepted for publication in Forestry. (*J. J. MacGregor.*)

FOREST UTILISATION AND ENGINEERING

Original Paper

A new method of timber extraction by cable, by A. H. Lloyd. Empire Forestry Review, Vol. 28, No. 4, 1949.

Review

Home Timber Production, 1939-45, by Russell Meiggs. The Times Review of Industry, 1949. (*A. H. Lloyd.*)

FOREST PROTECTION

Original Paper

Fire Protection in the American West Coast Forests, by H. G. Champion. Empire Forestry Review, Vol. 29, pp. 36-39, 1950.

SOIL SCIENCE

Review

Laboratory Methods for Work with Plant and Soil Nematodes, by T. Goodey. Entomologists' Monthly Magazine, No. 121, p. iii. (*P. W. Murphy.*)

I. STAFF ENGAGED IN INSTRUCTION AND RESEARCH

PROFESSOR H. G. CHAMPION, C.I.E., D.Sc., M.A. (Oxon.). Tropical Forestry, Forest Policy.

L. CHALK, M.A., D.Phil. (Oxon.). Wood Structure and Properties.

W. R. DAY, M.A., B.Sc. (Oxon.). Pathology, Forest Hygiene.

A. H. LLOYD, O.B.E., M.C., T.D., M.A. (Oxon.). Forest Engineering and Utilisation.

R. N. CHRYSTAL, D.Sc. (Edin.), Hon. M.A. (Oxon.). Forest Zoology.

N. V. BRASNETT, M.A., Dip. For. (Cantab.). Forest Management.

M. L. ANDERSON, M.C., M.A. (Oxon)., D.Sc. (Edin.). Mensuration.

J. J. MACGREGOR, B.Sc. (Glasgow), M.S. (Wisc.), B.Litt., M.A. (Oxon.). Forest Economics.

E. W. JONES, M.A. (Oxon.), Ph.D. (Cantab.). Silviculture.

W. R. C. HANDLEY, M.A. (Oxon.), Ph.D. (Leeds). Microbiology.

L. LEYTON, M.A. (Oxon.), Ph.D. (Leeds). Tree Physiology.

G. W. DIMBLEBY, M.A., B.Sc. (Oxon.). Forest Ecology.

F. WHITE, B.A. (Cantab.). Forest Botany.

P. J. RENNIE, B.Sc. (Lond.). Soil Research.

P E. W. MURPHY, B.Agr.Sci. (Dublin). Soil Research.

G. H. THOMPSON, B.Sc. (Oxon.). Forest Zoology.

II. STAFF OF OTHER UNIVERSITY DEPARTMENTS ASSISTING IN INSTRUCTIONAL WORK

A. C. HOYLE, M.A., B.Sc. (Oxon.). Forest Botany and Ecology.

E. W. RUSSELL, M.A. (Oxon.), Ph.D. (Cantab.). Soil Science.

G. R. CLARKE, M.A., B.Sc. (Oxon.). Soil Science.

A. R. ROBBINS, M.A. (Oxon.). Surveying.

M. R. SAMPFORD, B.Sc. (Lond.). Statistical Methods.

III. OTHER STAFF

Secretary: Miss H. M. EDWARDS.
Assistant Secretary: Miss I. BLAGROVE.
Accountant: Mr. A. A. ADAMS.
Librarian: Miss G. GUINEY.
Assistant Librarians: Mr. Y. SMYTHIES, M.A. (Cantab.).
Mr. E. F. HEMMINGS.